AVT Bigeye

Technical Manual

Low-noise CCD camera with GigE interface and optional cooling

V2.2.0

30 April 2012

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///ALLIED
Vision Technologies

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Allied Vision Technologies GmbH 05/2012

Contents

Contacting Allied Vision Technologies

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Introduction

This **Bigeye Technical Manual** describes in depth the technical specifications, dimensions, all pixel formats, bandwidth and frame rate related subjects.

Note	**Please read through this manual carefully.**
(i)	We assume that you have read already the **How to install a GigE camera (Bigeye/Pearleye/Goldeye)** and that you have installed the hardware and software on your PC or laptop (GigE interface card, cables etc.). http://www.alliedvisiontec.com/emea/support/downloads/product-literature.html

Document history

Version	Date	Description
V2.0.0	03.11.11	New Bigeye Technical Manual
V2.1.0	23.01.12	Changed naming: from Bigeye x-xxxx **Solar Cool** to Bigeye x-xxxx **NIR Cool** • Chapter Bigeye P-132B/C Cool / Bigeye P-132B NIR Cool on page 14 • Chapter Bigeye P-629B Cool / P-629B NIR Cool on page 16 • Figure 3: Spectral sensitivity of Bigeye P-132B NIR Cool on page 21 • Figure 4: Spectral sensitivity of Bigeye P-629B Cool / P-629B NIR Cool on page 21 • Chapter Bigeye P-132B/C Cool and P-132B NIR Cool on page 25ff. • Chapter Bigeye P-629B Cool / NIR Cool on page 27ff. • Chapter Camera I/O connector pin assignment (15-pin D-Sub jack) on page 31ff.
to be continued on next page		

Table 1: Document history

Version	Date	Description
		continued from last page
V2.1.0 [continued]	23.01.12 [continued]	**Specifications data corrected** • Changed Power requirements and mass in Chapter Specifications on page 12ff. **Added feature** • Added Chapter CameraSpecialFeatures\BackgroundCorrection on page 94 **Changed values in Interface chapter** • Power supply values in Chapter Camera I/O connector pin assignment (15-pin D-Sub jack) on page 31 • Dropped 1.3 A (Power supply) in Figure 12: Camera I/O connector pin assignment (Bigeye P-629B Cool/NIR Cool) on page 32 • Power supply values in Chapter Power supply (pin 1-4) on page 33 **Some minor corrections** • Changed values in Chapter Line-sync output (pin 14) on page 37 and in Chapter Frame-sync output (pin 15) on page 38 • Line instead of line in Figure 19: Frame-sync output (Bigeye P-132) on page 38 • Increased drawings for better readability in Chapter Spectral sensitivity on page 20
V2.2.0	30.04.12	• Deleted uncooled camera photo on title page • Corrected frame rates for Bigeye P-629: see Chapter Bigeye P-629B Cool / P-629B NIR Cool on page 16 • Added background correction for all Bigeye models: Chapter Specifications on page 12ff. • Deleted *binning* and *1280 x 512* in *frame rate feature* in Chapter Bigeye P-132B/C Cool / Bigeye P-132B NIR Cool on page 14 • Corrected wording: *Stabilized to an absolute value of …* in *cooling feature* in Chapter Specifications on page 12ff. • Added: *adjustable in 658.29 µs steps (or 390.10 µs steps in binning mode)* in *exposure time feature* in Chapter Bigeye P-629B Cool / P-629B NIR Cool on page 16 • Added: *(rectangular, circle, ring, line)* to *analyze multiple regions* in *smart features* in Chapter Specifications on page 12ff.

Table 1: Document history

Manual overview

This **manual overview** outlines the contents of each chapter of this manual.

- Chapter Contacting Allied Vision Technologies on page 5 lists AVT contact data (phone numbers and URLs) for both:
  - Technical information / ordering
  - Commercial information
- Chapter Introduction on page 6 (this chapter) gives you the document history, a manual overview (short description of each chapter) and conventions used in this manual (styles and symbols).
- Chapter Conformity on page 11 gives you information about conformity of AVT cameras (CE, RoHS).
- Chapter Specifications on page 12 lists camera details and measured spectral sensitivity diagrams for each camera type.
- Chapter Camera dimensions on page 23 provides CAD drawings of standard housing models, tripod adapter.
- Chapter Camera interfaces on page 31 describes in general the inputs/outputs of the cameras (incl. trigger features).
- Chapter Index on page 48 gives you quick access to all relevant data in this manual.

Conventions used in this manual

To give this manual an easily understood layout and to emphasize important information, the following typographical styles and symbols are used:

Styles

Style	Function	Example
Bold	Programs, inputs or highlighting important things	**bold**
Courier	Code listings etc.	`Input`
Upper case	Register	REGISTER
Italics	Modes, fields	*Mode*
Parentheses and/or blue	Links	(Link)

Table 2: Styles

Symbols

Note

This symbol highlights important information.

Caution

This symbol highlights important instructions. You have to follow these instructions to avoid malfunctions.

www

This symbol highlights URLs for further information. The URL itself is shown in blue.

Example:

http://www.alliedvisiontec.com

Before operation

We place the highest demands for quality on our cameras.

Target group

This **Technical Manual** is the guide to detailed technical information of the camera and **is written for experts**.

Note

Please read through this manual carefully before operating the camera.

Caution

Before operating any AVT camera read the following **safety instructions** and **ESD warnings.**

Safety warnings

Caution **Electrostatic discharge**

The camera contains sensitive electronic components which can be destroyed by means of electrostatic discharge.

Use sufficient grounding to minimize the risk of damage.

Conformity

Allied Vision Technologies declares under its sole responsibility that all standard cameras of the **Bigeye** family to which this declaration relates are in conformity with the following standard(s) or other normative document(s):

- CE, following the provisions of 2004/108/EG directive
- RoHS (2002/95/EC)

CE

We declare, under our sole responsibility, that the previously described **Bigeye** cameras conform to the directives of the CE.

Specifications

Note The warranty becomes void in case of unauthorized tampering or any manipulations not approved by the manufacturer.

Bigeye P-132B

Feature	Specification
Image device	Type 2/3, progressive scan, Sony ICX 285AL, interline transfer sensor (no mechanical shutter required) EXView HAD
Effective chip size	**8.26 mm (H) x 6.6 mm (V)**
Cell size	6.45 µm x 6.45 µm
Picture size (max.)	1280 (H) x 1024 (V)
Lens mount	C-Mount
Pixel format	Mono8, Mono10, Mono12
Frame rate	up to 12.5 fps (full frame) up to 25 fps (binning: 1280 x 512)
ADC	14 bits
Exposure time	100 µs ... 1000 seconds in 76.19 µs steps
Digital output	12 bit
I/Os	Two inputs (one optocoupled) three outputs (one optocoupled)
Smart features	Vertical binning (1 x 2), switchable gain (+ 6 dB), continuous mode (image acquisition with maximum frame rate), image-on-demand mode (triggered image acquisition), background correction With AVT AcquireControl: BCG LUT, auto contrast, auto brightness, analyze multiple regions within image, real-time statistics and histogram
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Power requirements	+ 12 V (+5 %), max. 0.85 A
Dimensions	89 mm x 90 mm x 71 mm (L x W x H); incl. connectors, without tripod and lens
Mass	730 g (without lens)

Table 3: Specification Bigeye P-132B

Feature	Specification
Environmental air temperature	0 °C … 35 °C
Regulations	CE, RoHS (2002/95/EC)

Table 3: Specification Bigeye P-132B

Note

The design and specifications for the products described above may change without notice.

Note

- The right polarization of the 12 V supply voltage has to be taken into consideration.
- The warranty becomes void in case of unauthorized tampering or any manipulations not approved by the manufacturer.

Bigeye P-132B/C Cool / Bigeye P-132B NIR Cool

Feature	Specification
Image device	Type 2/3, progressive scan, Sony ICX 285AL, interline transfer sensor (no mechanical shutter required) ExView HAD
Effective chip size	**8.26 mm (H) x 6.6 mm (V)**
Cell size	6.45 µm x 6.45 µm
Picture size (max.)	1280 (H) x 1024 (V)
Lens mount	C-Mount
ADC	14 bits
Pixel format	Mono8, Mono10, Mono12 Bigeye P-132C Cool: additional BayerGB8, BayerGB10, BayerGB12
Frame rate	up to 12.5 fps (full frame) up to 25 fps (640 x 512)
Exposure time	100 µs … 1000 seconds, adjustable in 76.19 µs steps
Cooling	Peltier cooling Stabilized to an absoluet value of - 20 °C (up to +25 °C ambient temperature)
Digital output	12 bit
I/Os	Two inputs (one optocoupled) three outputs (one optocoupled)
Smart features	Binning (Cool: 1 x 2; NIR Cool: 2 x2) , Gain (+ 6 dB), continuous mode (image acquisition with maximum frame rate), image-on-demand mode (triggered image acquisition), background correction With AVT AcquireControl: BCG LUT, auto contrast, auto brightness, analyze multiple regions (rectangular, circle, ring, line) within image, real-time statistics and histogram
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Power requirements	+ 12 V (+ 5 %), max. 2.8 A
Dimensions	111 mm x 90 mm x 99 mm (L x W x H); incl. connectors, without tripod and lens
Mass	1340 g (without lens)
Operating temperature	0 °C … 35 °C
Regulations	CE, RoHS (2002/95/EC)

Table 4: Specification Bigeye P-132B/C Cool, Bigeye P-132B NIR Cool

Note

The design and specifications for the products described above may change without notice.

Note

- The right polarizat ion of the 12 V supply voltage has to be taken into consideration.
- The two hexagon socket screws (M 5) in the front plate may in no case be loosened as otherwise the vacuum area is getting leaky.
- The warranty becomes void in case of unauthorized tampering or any manipulations not approved by the manufacturer.

Bigeye P-629B Cool / P-629B NIR Cool

Feature	Specification
Image device	Type 35 mm, CCD progressive scan, Kodak KAF-6303E, full-frame transfer sensor
Effective chip size	**27.65 mm (H) x 18.43 mm (V)**
Cell size	9.00 μm x 9.00 μm
Picture size (max.)	3072 (H) x 2048 (V)
Lens mount	F-Mount
Shutter	50 ms … 30 min (built-in electromechanical long-live shutter: min. 1 x 10^6 cycles)
Pixel format	Mono8, Mono10, Mono12, Mono14, Mono16
Frame rate	up to 0.67 fps (full frame) up to 1.9 fps (binning: 1536 x 1024)
Readout time	1.35 s at 3072 x 2048 0.4 s at 1536 x 1024
Exposure time	50 ms … 30 min, adjustable in 658.29 μs steps (or 390.10 μs steps in binning mode)
Cooling	Peltier cooling Stabilized to an absolute value of +5 °C (up to +25 °C ambient temperature)
ADC	14 bit
Digital output	14 bit
I/Os	Two inputs (one optocoupled) three outputs (one optocoupled)
Smart features	Binning (2 x 2), switchable gain (+ 6 dB), continuous mode (image acquisition with maximum frame rate), image-on-demand mode (triggered image acquisition), background correction With AVT AcquireControl: BCG LUT, auto contrast, auto brightness, analyze multiple regions (rectangular, circle, ring, line) within image, real-time statistics and histogram
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Power requirements	+ 12 V (+ 5 %), max. 2.8 A
Dimensions	141.75 mm x 90 mm x 109 mm (L x W x H); incl. connectors, without tripod and lens
Mass	1460 g (without lens)

Table 5: Specification Bigeye P-629B Cool / P-629B NIR Cool

Feature	Specification
Operating temperature (ambient)	0 °C ... 35 °C
Regulations	CE, RoHS (2002/95/EC)

Table 5: Specification Bigeye P-629B Cool / P-629B NIR Cool

Note

The design and specifications for the products described above may change without notice.

Note

- The right polarization of the 12 V supply voltage has to be taken into consideration.
- The warranty becomes void in case of unauthorized tampering or any modifications not approved by the manufacturer.

Bigeye P-1100B/C Cool

Feature	Specification
Image device	Type 35 mm, CCD progressive scan, Kodak KAI11002, interline transfer sensor (IT) (no mechanical shutter required) global shutter
Effective chip size	**36.22 mm (H) x 24.12 mm (V)**
Cell size	9.00 µm x 9.00 µm
Picture size (max.)	4024 (H) x 2680 (V)
Lens mount	F-Mount
Electronic shutter	Asynchronous up to 1/1000 s (image-on-demand), adjustable in 232 µs steps
Pixel format	**b/w:** Mono8, Mono10, Mono12 **color:** Mono8, Mono10, Mono12, BayerRG8, BayerRG10, BayerRG12
Frame rate	up to 1.6 fps (full frame) up to 3.2 fps (binning: 4024 x 1340)
Exposure time	1 ms ... 60 seconds, adjustable in 232.38 µs steps
Cooling	Peltier cooling Stabilized to an absolute value of 0 °C (up to +25 °C ambient temperature)
ADC	14 bit
Digital output	12 bit
I/Os	Two inputs (one optocoupled), three outputs (one optocoupled)
Smart features	Vertical binning (1 x 2), switchable gain (+ 6 dB), continuous mode (image acquisition with maximum frame rate), image-on-demand mode (triggered image acquisition), background correction With AVT AcquireControl: BCG LUT, auto contrast, auto brightness, analyze multiple regions (rectangular, circle, ring, line) within image, real-time statistics and histogram
Digital interface	IEEE 802.3 1000BASE-T (GigE Vision V1.2)
Power requirements	+ 12 V (+ 5 %), max. approx. 3.0 A
Dimensions	143 mm x 90 mm x 99 mm (L x W x H); incl. connectors, without tripod and lens
Mass	1390 g (without lens)
Operating temperature	0 °C ... 40 °C
Regulations	CE, RoHS (2002/95/EC)

Table 6: Specification Bigeye P-1100B/C Cool

Note

The design and specifications for the products described above may change without notice.

Note

- The right polarization of the 12 V supply voltage has to be taken into consideration.
- The warranty becomes void in case of unauthorized tampering or any manipulations not approved by the manufacturer.
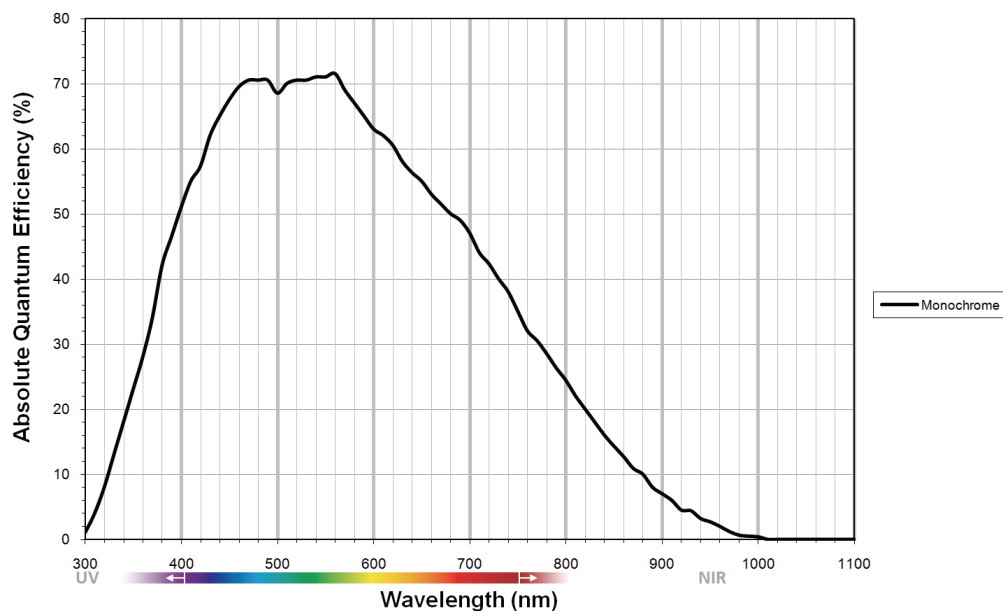
Spectral sensitivity

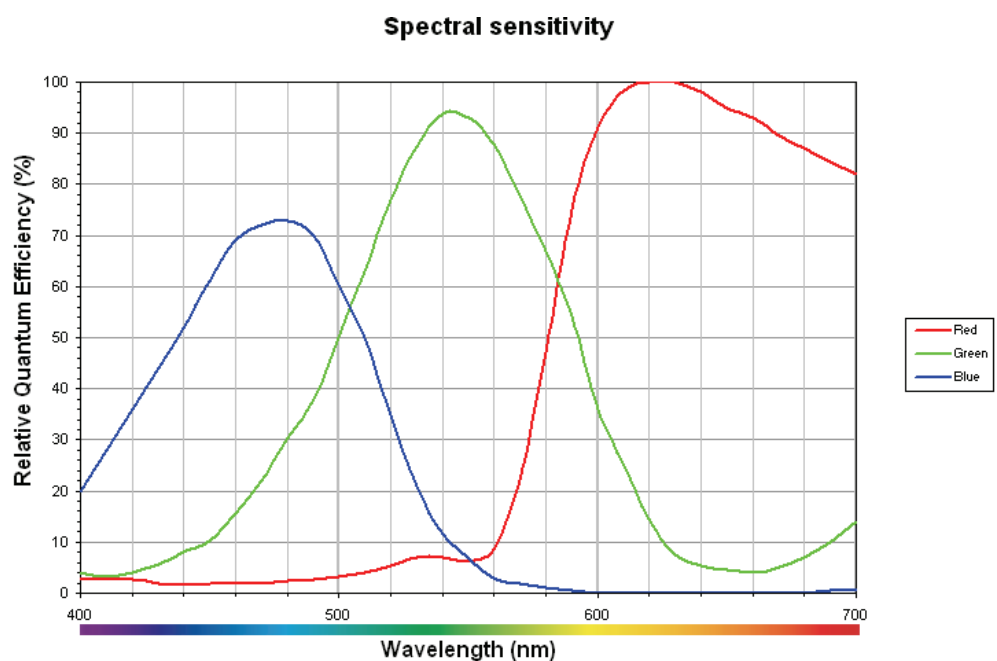Figure 1: Spectral sensitivity of Bigeye P-132B / P-132B Cool

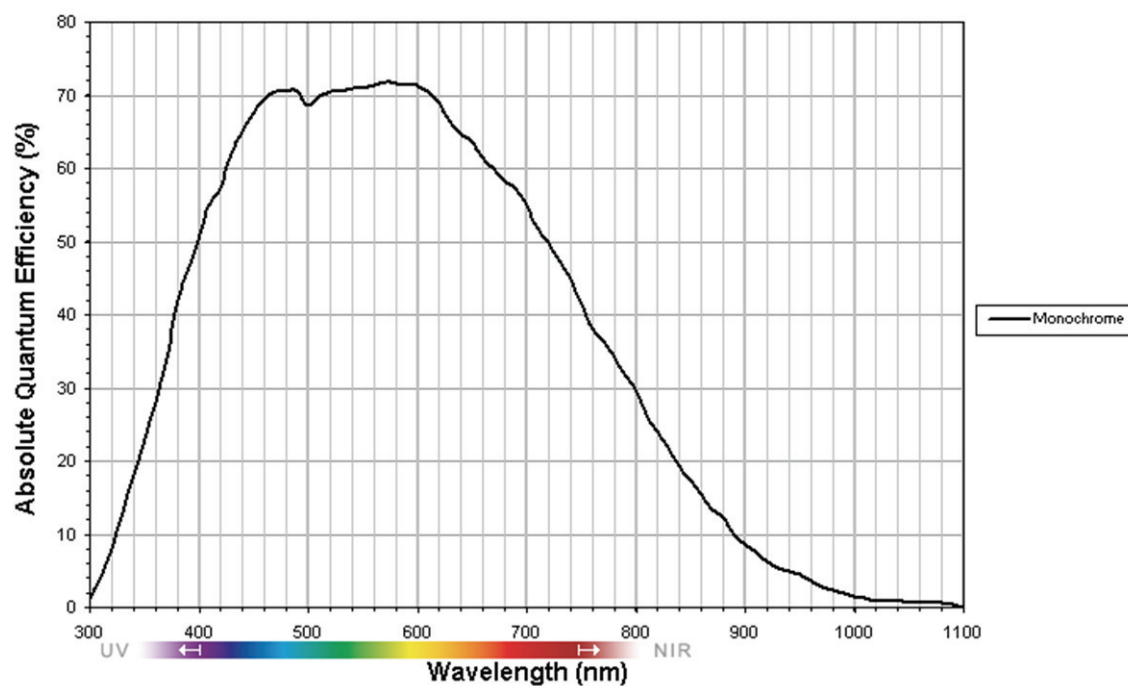Figure 2: Spectral sensitivity of Bigeye P-132C Cool

Figure 3: Spectral sensitivity of Bigeye P-132B NIR Cool
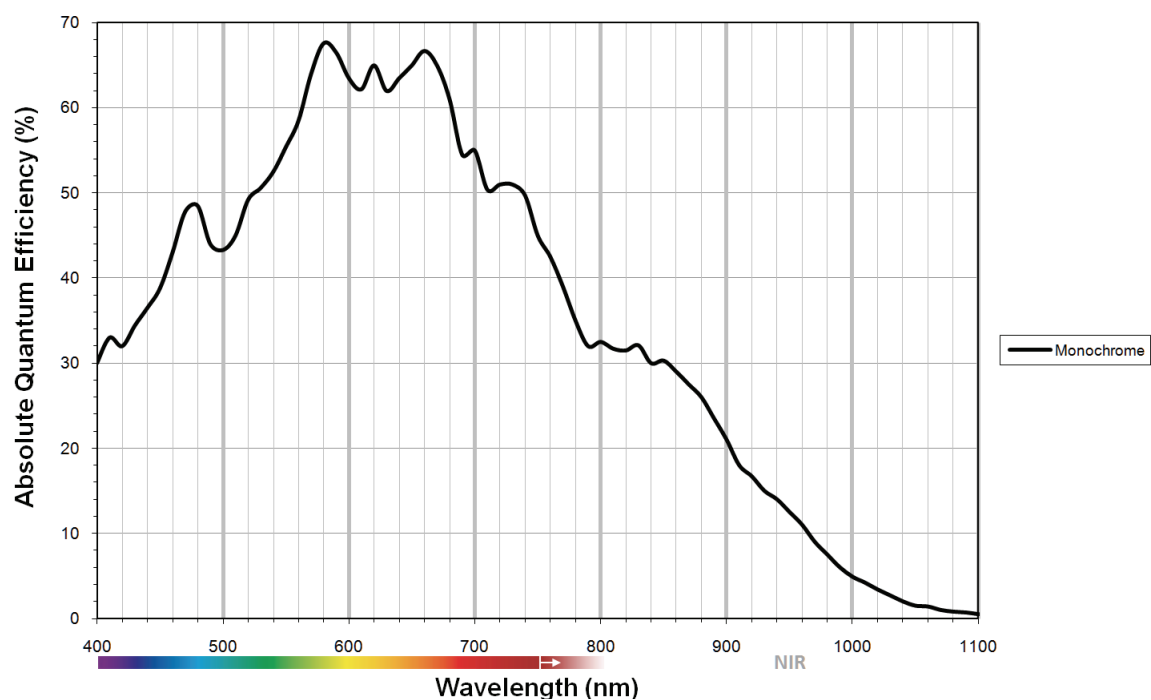

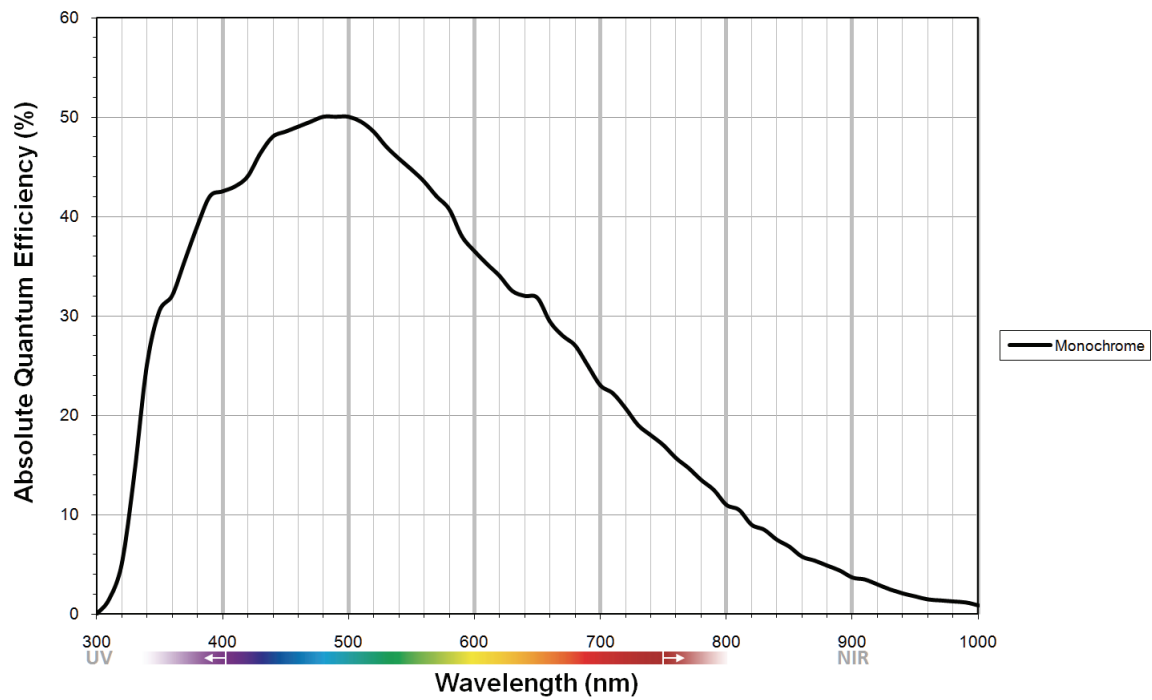Figure 4: Spectral sensitivity of Bigeye P-629B Cool / P-629B NIR Cool

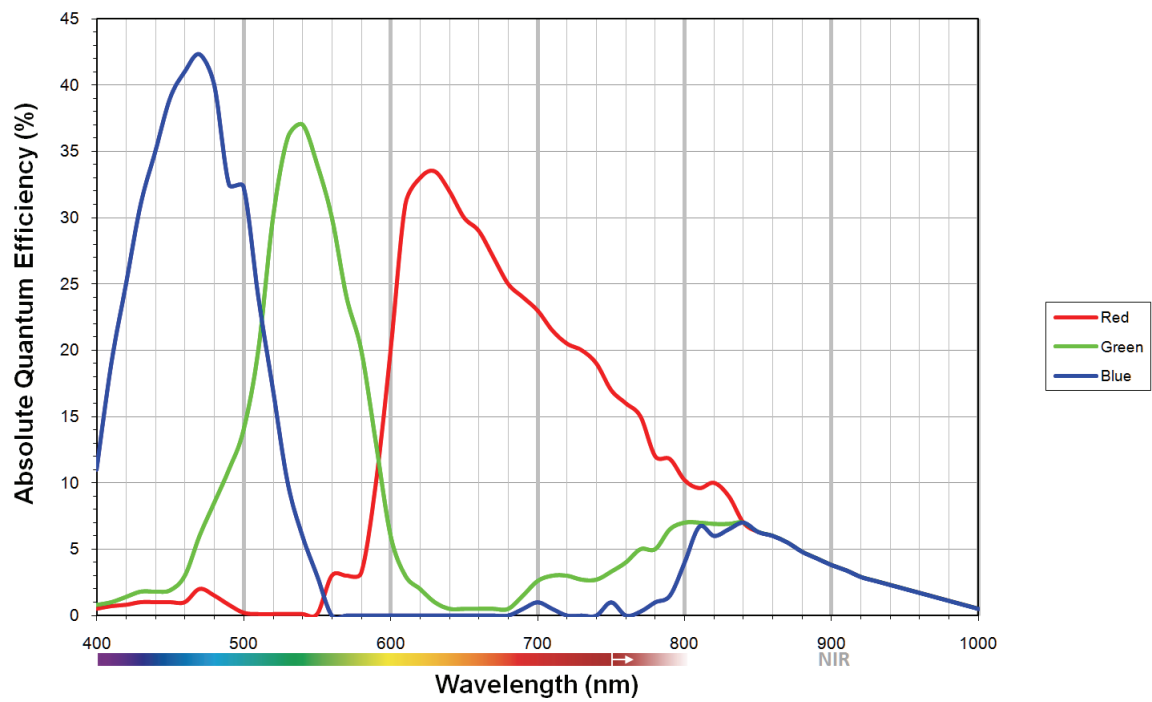Figure 5: Spectral sensitivity of Bigeye P-1100B Cool

Figure 6: Spectral sensitivity of Bigeye P-1100C Cool

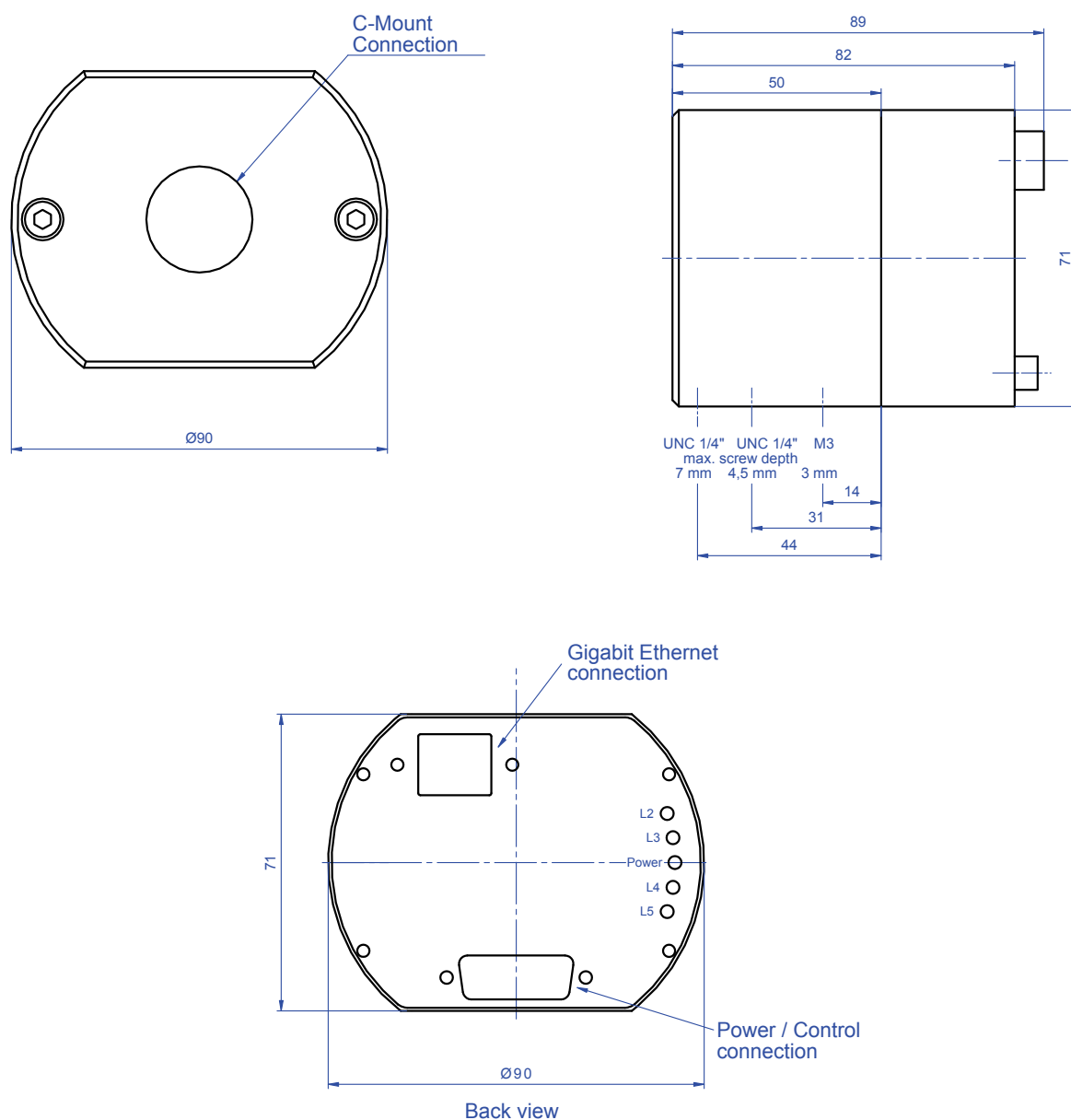# Camera dimensions

Bigeye P-132B

Figure 7: Camera dimensions: Bigeye P-132B (front/side/back)

LED	Color	Description
L2	Red	Camera is operational
L3	Red	Image-on-demand mode
Power	Green	Power indicator
L4	Red	Exposure input activity
L5	Red	Frame output activity

Table 7: Description of LEDs: Bigeye P-132B

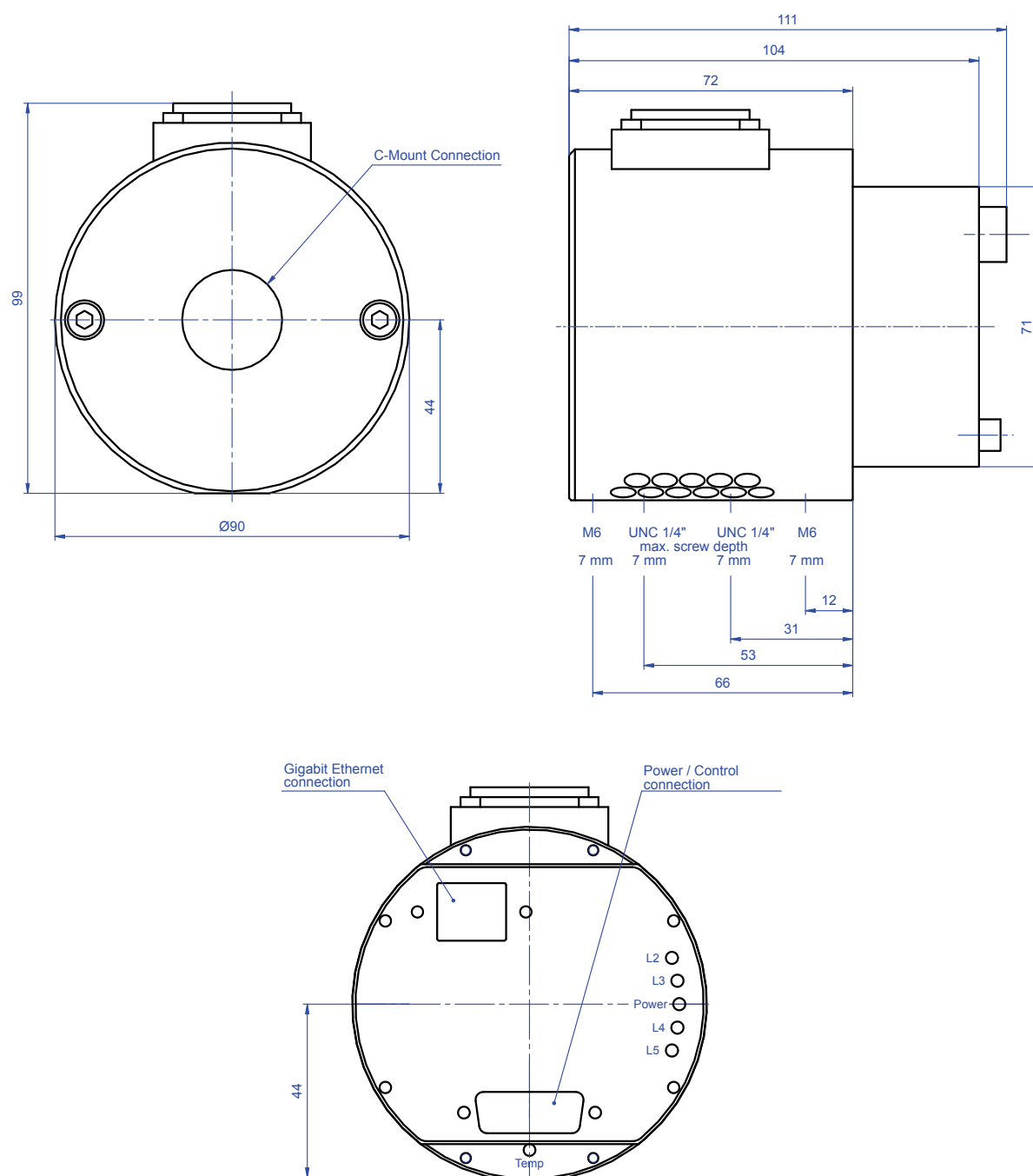# Bigeye P-132B/C Cool and P-132B NIR Cool

Figure 8: Camera dimensions: Bigeye P-132B/C Cool and P-132B NIR Cool (front/side/back)

LED	Color	Description
L2	Red	Camera is operational
L3	Red	Temperature state (same function as Temp LED)
Power	Green	Power indicator
L4	Red	Exposure input activity
L5	Red	Frame output activity
Temp	Red	Indicates that cooling temperature has not reached approx. -20 °C. If this LED is permanently lit during operation, then the temperature of the camera might be too high: Check the ambient temperature and ensure unhindered air flow.

Table 8: Description of LEDs: Bigeye P-132B/C Cool and P-132B NIR Cool
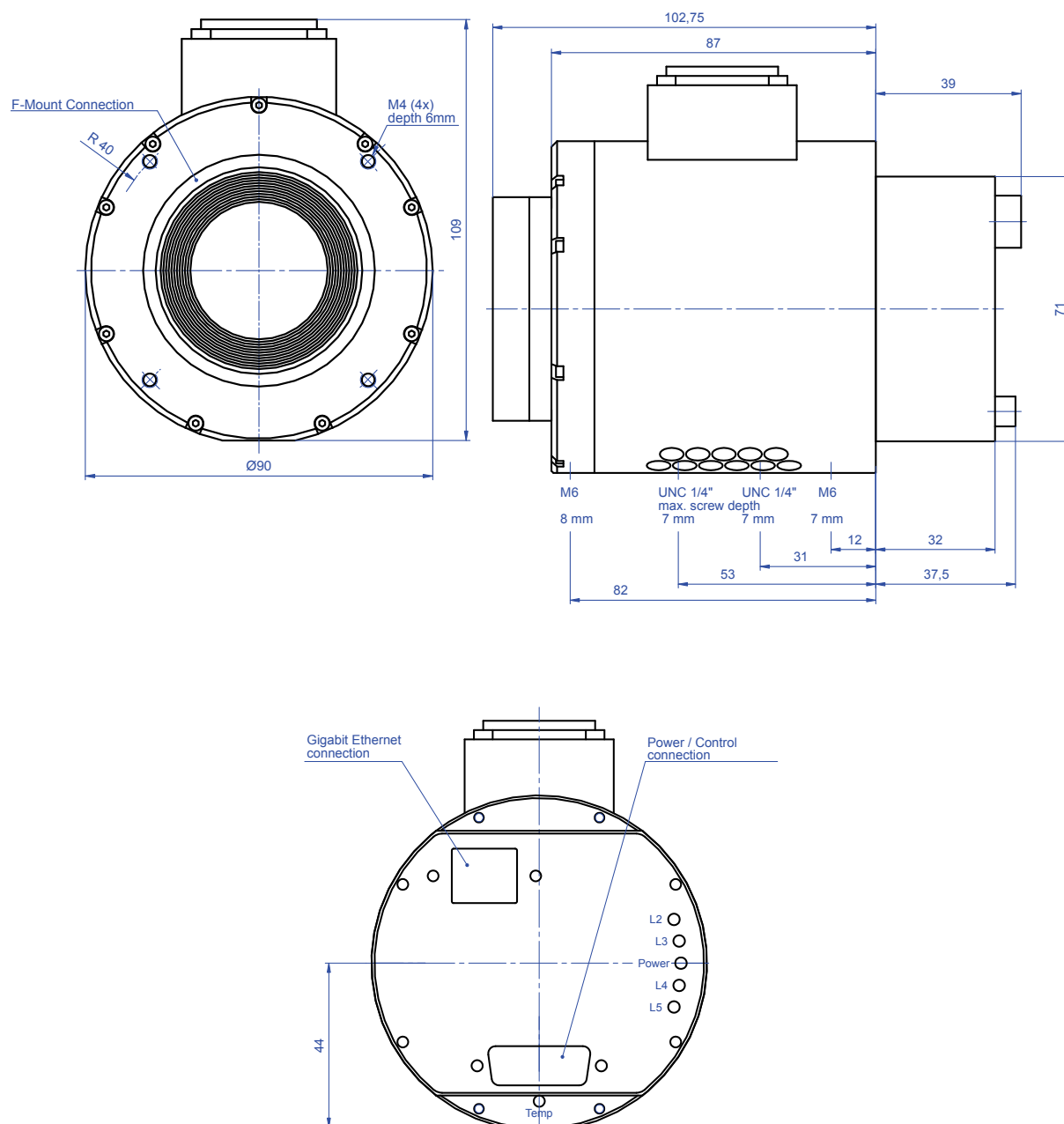
Bigeye P-629B Cool / NIR Cool

Figure 9: Camera dimensions: Bigeye P-629B Cool / NIR Cool (front/side/back)

LED	Color	Description
L2	Red	Camera is operational
L3	Red	Temperature state (same function as Temp LED)
Power	Green	Power indicator
L4	Red	Exposure input activity
L5	Red	Frame output activity
Temp	Red	Indicates that cooling temperature has not reached approx. +5 °C. If this LED is permanently lit during operation, then the temperature of the camera might be too high: Check the ambient temperature and ensure unhindered air flow.

Table 9: Description of LEDs: Bigeye P-629B Cool and Bigeye P-629B NIR Cool

Bigeye P-1100B/C Cool
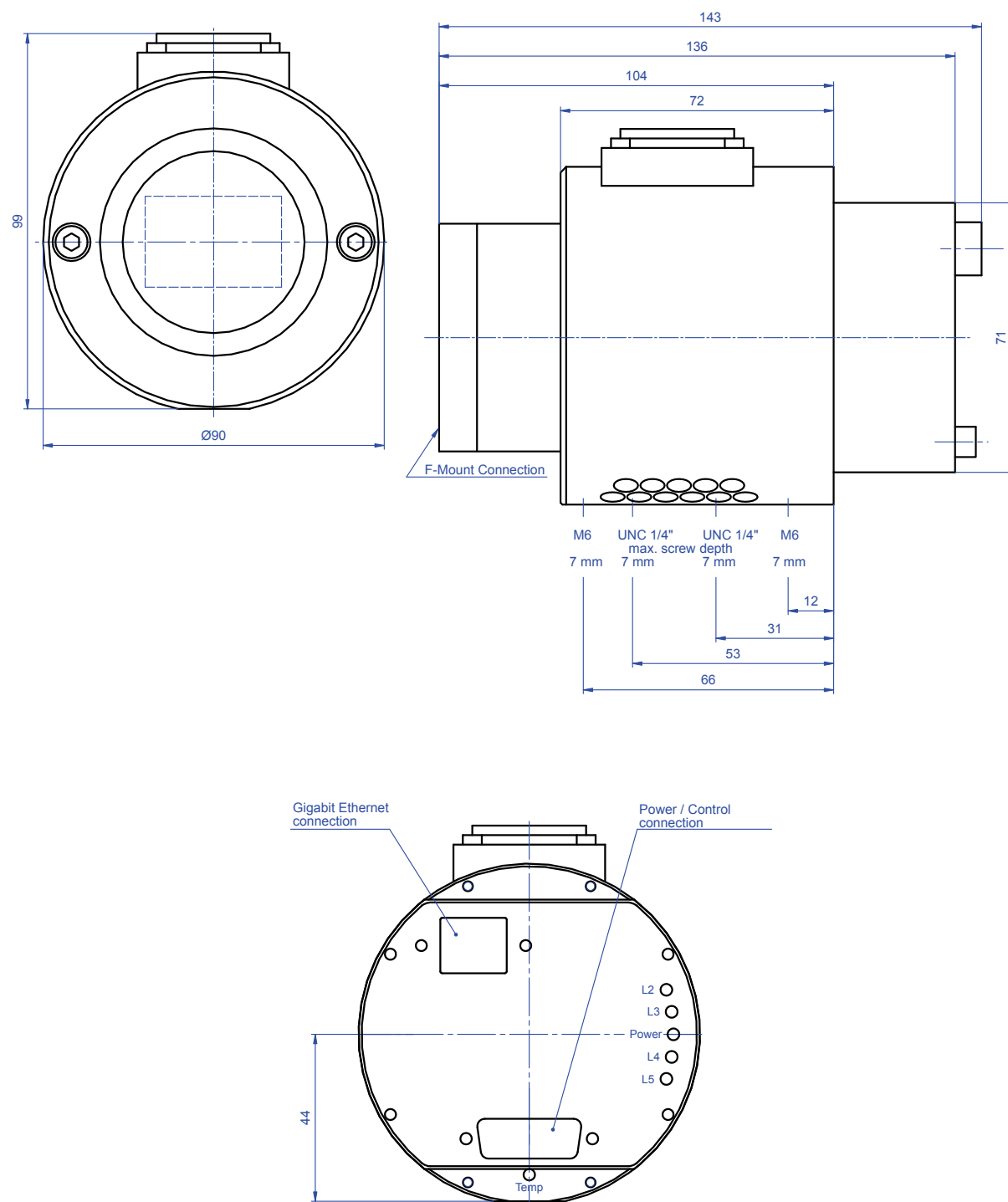

F-Mount Connection

M6
7 mm

UNC 1/4"
max. screw depth
7 mm

UNC 1/4"
7 mm

M6
7 mm

Gigabit Ethernet
connection

Power / Control
connection

L2
L3
Power
L4
L5

Temp

Figure 10: Camera dimensions: Bigeye P-1100B/C Cool (front/side/back)

LED	Color	Description
L2	Red	Camera is operational
L3	Red	Image-on-demand mode
Power	Green	Power indicator
L4	Red	Exposure input activity
L5	Red	Frame output activity
Temp	Red	Indicates that cooling temperature has not reached approx. 0 °C. If this LED is permanently lit during operation, then the temperature of the camera might be too high: Check the ambient temperature and ensure unhindered air flow.

Table 10: Description of LEDs: Bigeye P-1100B/C Cool

Camera interfaces

This chapter gives you information on the control junction, inputs and outputs and trigger features.

www

For accessories like cables see:

http://www.alliedvisiontec.com/emea/products/
accessories/gige-accessories.html

Control junction

Camera I/O connector pin assignment (15-pin D-Sub jack)

This jack is intended for the power supply as well as for controlling the camera by the user.

Bigeye P-132B / P-132B Cool / P-132B NIR Cool

Pin	Signal	Direction	Level	Description
1	External Power		+12 V DC	Power supply
2				max. 0.85 A for P-132B NIR Cool
				max. 2.8 A for P-132B Cool and P-132 NIR Cool
3	External GND			
4				
5	---			Reserved
6	---			Reserved
7	RXD	In	RS232	Serial control
8	TXD	Out	RS232	Serial control
9	Mode input	+	12V, 20 mA max.	Internal pull-up resistor
10	Trigger input	-	12V, 20 mA max.	Optocoupler input
11		+		
12	Exposure output	-	12V, 20 mA max.	Optocoupler output
13		+		
14	Line-sync output	Out	5 V (at no load)	Active low
15	Frame-sync output	Out	5 V (at no load)	Active low

Figure 11: Camera I/O connector pin assignment (Bigeye P-132B/Cool/NIR Cool)

This jack is intended for the power supply as well as for controlling the camera by the user.

Bigeye P-629B Cool/NIR Cool

Pin	Signal	Direction	Level	Description
1	External Power		+12 V DC	Power supply
2				max. 2.8 A
3	External GND			
4				
5	---			Reserved
6	---			Reserved
7	RXD	In	RS232	Serial control
8	TXD	Out	RS232	Serial control
9	Mode input	+	12 V, 20 mA max.	Internal pull-up resistor
10	Trigger input	-	12 V, 20 mA max.	Optocoupler input
11		+		
12	Exposure output	-	12 V, 20 mA max.	Optocoupler output
13		+		
14	Line-sync output	Out	5 V (at no load)	Active low
15	Frame-sync output	Out	5 V (at no load)	Active low

Figure 12: Camera I/O connector pin assignment (Bigeye P-629B Cool/NIR Cool)

This jack is intended for the power supply as well as for controlling the camera by the user.

Bigeye P-1100B Cool / P-1100C Cool

Pin	Signal	Direction	Level	Description
1	External Power		+12 V DC	Power supply
2				max. 3.0 A
3	External GND			
4				
5	---			Reserved
6	---			Reserved
7	RXD	In	RS232	Serial control
8	TXD	Out	RS232	Serial control
9	Mode input	+	12V, 20 mA max.	Internal pull-up resistor
10	Trigger input	-	12V, 20 mA max.	Optocoupler input
11		+		
12	Exposure output	-	12V, 20 mA max.	Optocoupler output
13		+		
14	Line-sync output	Out	5 V (at no load)	Active low
15	Frame-sync output	Out	5 V (at no load)	Active low

Figure 13: Camera I/O connector pin assignment (Bigeye P-1100B/C Cool)

Power supply (pin 1-4)

Bigeye P-132B/C (NIR) Cool

The camera requires 12 V +5% at a current capacity of maximum 2.8 A.

After attaining the end cooling temperature (- 20 °C) the current capacity goes down to approx. 1.1 ... 1.5 A. The exact value also depends on the ambient temperature of the camera.

Bigeye P-629B/C (NIR) Cool

The camera requires 12 V +5% at a current capacity of maximum 2.8 A.

After attaining the end cooling temperature (+5 °C) the current capacity goes down to approx. 0.8 ... 1.2 A. The exact value also depends on the ambient temperature of the camera.

Bigeye P-1100B/C Cool

The camera requires 12 V +5% at a current capacity of maximum 3.0 A.

After attaining the end cooling temperature (0 °C) the current capacity goes down to approx. 1.2 … 1.6 A. The exact value also depends on the ambient temperature of the camera.

Mode input (pin 9)

The mode input provides a method for switching the camera between different exposure control modes using an externally applied signal.

The indiviual function depends on the camera variant. The GigE Vision feature AcquisitionControl/TriggerMode can be used to switch the mode via software.

Note	• For more information see Chapter Mode setting on page 41.
(i)	• The active state (externally *low* or TriggerMode = *On*) is dominant, thus image-on-demand mode is active, if one of either settings is.

Bigeye P-132 The mode input switches between the continuous free-running operation with fixed 80 ms exposure time on the one hand and the image-on-demand mode (IOD) on the other hand.

For long-term exposures the image-on-demand mode (IOD mode) generally has to be activated. As a cooling of the sensor is only advantageous at longer exposure times, the cooling is generally only activated in the IOD mode. In the continuous mode the cooling is switched off. This feature allows to reduce the power consumption of the camera during standby. After re-enabling the IOD mode a cooling time of approx. 4 – 5 minutes is needed.

Input pin 9:   open (or TTL high)   ⇨ continuous operation (cooling off)

                    GND (or TTL low)   ⇨ image-on-demand (cooling active)

Bigeye P-629 This camera variant is always in image-on-demand mode and does not support continuous mode. Instead, this signal controls the behavior of the mechanical shutter.

The shutter is automatically closed during the read-out of the sensor, in order that no smear will take place. In case a pulsed light source is used, the shutter needs not to be closed. This can be forced by the corresponding mode setting.

Input pin 9:   open (or TTL high)   ⇨ shutter permanently open

                    GND (or TTL low)   ⇨ shutter closed during image output

Bigeye P-1100 The mode input switches between the continuous free-running operation with fixed 635 ms exposure time on the one hand and the image-on-demand mode (IOD mode) on the other hand.

For long-term exposures the image-on-demand mode (IOD mode) generally has to be activated. As a cooling of the sensor is only advantageous at longer exposure times, the cooling is generally only activated in the IOD mode. In the con-

tinuous mode the cooling is switched off. This feature allows to reduce the power consumption of the camera during standby. After re-enabling the IOD mode a cooling time of approx. 4 – 5 minutes is needed.

After switching to image-on-demand mode a break of at least 635 ms has to occur before the first image exposure can take place.

Input pin 9:   open (or TTL high)   ⇨ continuous operation (cooling off)

                 GND (or TTL low)   ⇨ image-on-demand (cooling active)

Trigger input (pin 10, 11)

This input allows control of the electronic or electromechanical shutter by an externally applied signal. It is necessary to switch the camera into image-on-demand mode to enable direct exposure control.

Note

ⓘ

For more information on image-on-demand mode: see Chapter Mode setting on page 41.

The signal is level-sensitive, thus the HIGH duration directly dictates the exposure time of the camera.
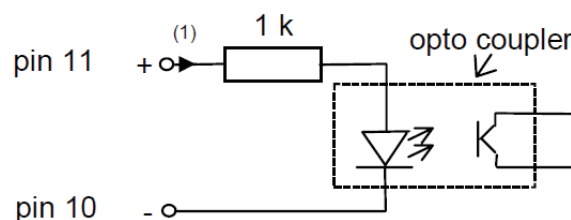

Figure 14: Trigger input diagram

The current through the opto coupler (1) should be greater than 1 mA and not exceed 20 mA:

5 … 12V (HIGH)   Active exposure (only valid during IOD mode)

<0.8 V (LOW)   Inactive (falling edge starts frame output)
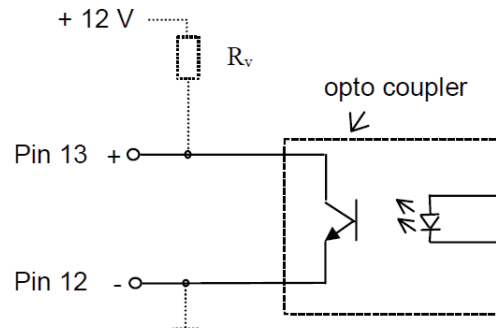
Exposure output (pin 12, 13)

Figure 15: Exposure output

Caution

The current which flows through the optocoupler should not exceed 20 mA (at 12 V $R_V \geq 600\ \Omega$).

Bigeye P-132

The exposure output indicates the active exposure time of the sensor.

Usage: synchronize an external strobe light source.

At the end of the exposure this output stays active approx. 76 µs (1 line) longer than the real exposure. The active exposure is indicated in the image-on-demand operation also by the LED **L4** on the backside of the camera. For using the exposure output an external resistor R_V according to the drawing has to be applied.

After the end of image exposure the 1024 active lines of the image are transmitted. This image output is displayed by LED L5 at the backside of the camera.

Bigeye P-629

The exposure output indicates the active exposure time of the sensor.

Usage: synchronize an external strobe light source.

At the end of the exposure this output stays active approx. 658 µs (1 line) longer than the real exposure. The active exposure is indicated in the image-on-demand operation also by the LED **L4** on the backside of the camera. For using the exposure output an external resistor R_V according to the drawing has to be applied.

After the end of image exposure the 2048 active lines of the image are transmitted. This image output is displayed by LED L5 at the backside of the camera.
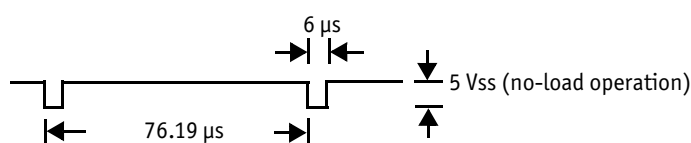
Bigeye P-1100

The exposure output indicates the active exposure time of the sensor.

Usage: synchronize an external strobe light source.

At the end of the exposure this output stays active approx. 232 µs (1 line) longer than the real exposure. The active exposure is indicated in the image-on-demand operation also by the LED **L4** on the backside of the camera. For using the exposure output an external resistor R_v according to the drawing has to be applied.

After the end of image exposure the 2680 active lines of the image are transmitted. This image output is displayed by LED L5 at the backside of the camera.

Line-sync output (pin 14)

Bigeye P-132

Figure 16: Line-sync output (**Bigeye P-132**)

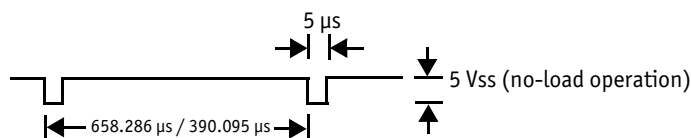The line-sync output (active low) supplies approx. 1200 mV at a termination with 75 Ω.

Bigeye P-629

Figure 17: Line-sync output (**Bigeye P-629**)

The line-sync output (active low) supplies approx. 900 mV at a termination with 75 Ω.
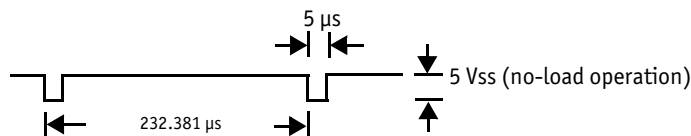
Bigeye P-1100

Figure 18: Line-sync output (**Bigeye P-1100**)

The line-sync output (active low) supplies approx. 1200 mV at a termination with 75 Ω.

Frame-sync output (pin 15)

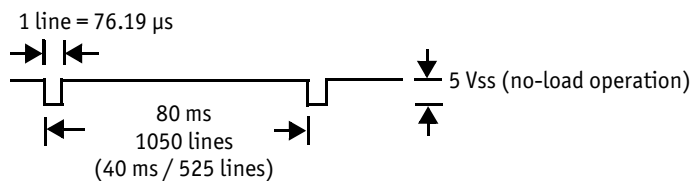**Bigeye P-132**   The frame-sync output is only active in continuous operation.

1 line = 76.19 µs

80 ms
1050 lines
(40 ms / 525 lines)

5 Vss (no-load operation)

Figure 19: Frame-sync output (**Bigeye P-132**)

The frame-sync output (active low) supplies approx. 1200 mV at a termination with 75 Ω.

Bigeye P-629   The frame-sync output becomes active at the beginning of an image output.

1 line = 658.286 µs (390.095 µs for binning mode)

1379.767 ms / 2096 lines
(424.424 ms / 1088 lines)
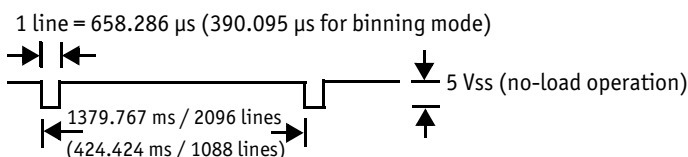
5 Vss (no-load operation)

Figure 20: Frame-sync output (**Bigeye P-629**)

The frame-sync-output (active low) supplies approx. 900 mV at a termination with 75 Ω.

Bigeye P-1100   The frame-sync output is only active in continuous operation.

1 line = 232.381 µs

634.865 ms / 2732 lines
(317.432 ms / 1366 lines)
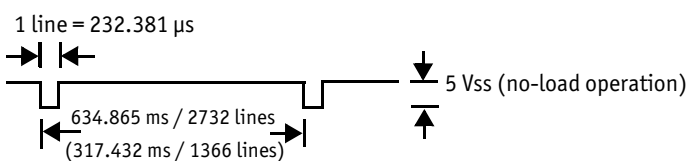
5 Vss (no-load operation)

Figure 21: Line-sync output (**Bigeye P-1100**)

The frame-sync-output (active low) supplies approx. 1200 mV at a termination with 75 Ω.

GigE interface

The Bigeye cameras are equipped with a 1000Base-T Ethernet interface. The data connection between camera and PC can be established via a standard CAT5e patch cable to a 1000Base-T compatible Ethernet adapter card.

To control the Bigeye cameras use the AVT AcquireControl software or any GigE Vision V1.2 compliant 3rd party software package.

Pin assignment of Gigabit Ethernet jack

The **Bigeye P-008/032** cameras are equipped with a 1000Base-T Ethernet interface (RJ-45 connector). The data connection between camera and PC can be established via a standard CAT5e patch cable.

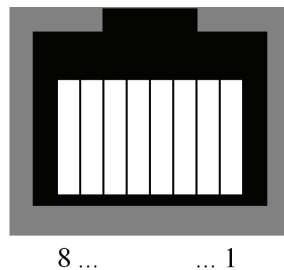| Note	For more information see the **Pleora iPORT PT1000-VB Documentation**.

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Figure 22: Front view of the Gigabit Ethernet jack

Pin	Signal
1	D1+
2	D1−
3	D2+
4	D3+
5	D3-
6	D2-
7	D4+
8	D4−

Table 11: GigE jack: pin assignment

Exposure control

Exposure time and dark time can be controlled using the features from the branch **AcquisitionControl** of the GigE Vision feature tree.

tbd: More detailed explanation of timing constraints (regarding frame rate and exposure time) of the individual camera models.

AcquisitionControl

Feature	Description
AcquisitionMode	This feature controls the acquisition mode of the software. This feature works independently (!) of the chosen camera mode (Continuous, IOD hardware trigger, IOD hardware timer). It describes how many frames should be acquired.
AcquisitionStart	Starts the image acquisition of the camera.
AcquisitionStop	Stops the image acquisition of the camera.
TriggerMode	Modifies the trigger mode of the camera. When the trigger mode is "Off", the camera will generate frames independently. When the trigger mode is "On" the camera is switched to the so called IOD (Image On Demand) mode. In this mode the camera waits for an external trigger signal or an timer pulse generated internally. To control exposure and dark time trigger mode must be switched to "On".
ExposureMode	Start or stop the internal exposure signal timer.
ExposureTime	This feature is used to set the Exposure time (in microseconds).
ExposureTimeAbs	This feature is used to set the Exposure time (in microseconds).
ExposureTimeGranularity	Exposure time granularity
ExposureTimeAbsMs	This feature is used to set the Exposure time (in milliseconds).
DarkTime	This feature is used to set the Dark time (in microseconds).
DarkTimeAbs	This feature is used to set the Dark time (in microseconds).
DarkTimeGranularity	Dark time granularity
DarkTimeAbsMs	This feature is used to set the Dark time (in milliseconds).

Table 12: Camera standard feature: AcquisitionControl

Note

ⓘ

Bigeye P-132, Bigeye P-1100: The TriggerMode feature has to be set to **On** and the timer has to be enabled via ExposureMode in order to control the exposure.

Note

(i) **Bigeye P-629**: The timer has to be enabled via the ExposureMode feature in order to control the exposure. Set the TriggerMode feature to **On** if the electromechanical shutter operation is needed, otherwise it will stay permanently open.

Beside the internal exposure control capabilities also direct exposure control by an externally applied signal is possible. In this case the ExposureMode has to be configured to **Off** to deactivate the internal timer.

Mode setting

The GigE Vision feature AcquisitionControl/TriggerMode setting provides a method for switching the camera between different exposure control modes. The individual function depends on the camera variant.

The *Mode input (pin 9)* can be used to control this setting using an external signal.

Note

(i)

Note

(i) The active state (externally *low* at pin 9 or TriggerMode = **On**) is dominant, thus image-on-demand is active if one of either settings is.

Camera	TriggerMode	Description
Bigeye P-132B	On	Image-on-demand mode.
		Exposure control via ExposureTime and DarkTime features (ExposureMode = Timed) or externally (ExposureMode = Off).
	Off	Continuous mode with fixed exposure time and frame rate.
Bigeye P-132x Cool	On	Image-on-demand mode.
		Peltier cooling active.
		Exposure control via ExposureTime and DarkTime features (ExposureMode = Timed) or externally (ExposureMode = Off).
	Off	Continuous mode with fixed exposure time and frame rate.
		Peltier cooling inactive (power saving).

Table 13: TriggerMode

Camera	TriggerMode	Description
Bigeye P-629	On	Image-on-demand mode.
		Electromechanical shutter enabled.
		Exposure control via ExposureTime and DarkTime features (ExposureMode = Timed) or externally (ExposureMode = Off).
	Off	Image-on-demand mode.
		Electromechanical shutter always open.
		Exposure control via ExposureTime and DarkTime features (ExposureMode = Timed) or externally (ExposureMode = Off).
Bigeye P-1100	On	Image-on-deman mode.
		Peltier cooling active.
		Exposure control via ExposureTime and DarkTime features (ExposureMode = Timed) or externally (ExposureMode = Off).
	Off	Continuous mode with fixed exposure time and frame rate.
		Peltier cooling inactive (power saving).

Table 13: TriggerMode

Binning

Each Bigeye camera variant supports one distinct binning configuration (either 1 x 2 or 2 x 2) which can be switched on or off.

This is controlled using the GigE Vision features **BinningVertical** and **BinningHorizontal** from the ImageSizeControl branch of the feature tree.

In the case of 2 x 2 binning the two features are coupled. This if one of **BinningVertical** or **BinningHorizontal** is changed, the counterpart is automatically changed, too.

ImageSizeControl

Feature	Description
BinningHorizontal	Number of **horizontal** photo-sensitive cell pixels to combine together. This increases the intensity (or signal-to-noise ratio) of the pixels and reduces the **horizontal** resolution (**width**) of the image.
BinningVertical	Number of **vertical** photo-sensitive cell pixels to combine together. This increases the intensity (or signal-to-noise ratio) of the pixels and reduces the **vertical** resolution (**height**) of the image.

Table 14: Camera standard feature: ImageSizeControl

Gain

Use the GigE Vision feature Gain from the feature branch AnalogControls to change the analog gain setting.

Value **1** selects 0 dB gain and Value **2** switches to +6 dB gain.

AnalogControls

Feature	Description
Gain	This feature controls the selected gain as a raw integer value.

Table 15: Camera standard feature: AnalogControls

Appendix

GigE Vision feature description for AVT Bigeye cameras

DeviceInformation

Feature	Description
DeviceModeName	Name of the attached camera model.
DeviceID	Unique 32 bit device ID of the AVT camera model.
DeviceUserID	User ID field. This field can be accessed (R/W) by the user to store an additional device identifier.
DeviceScanType	This feature specifies the scan type of the sensor (Areascan or Linescan).

Table 16: Standard: DeviceInformation

ImageSizeControl

Feature	Description
SensorWidth	Maximum width of the sensor in pixels.
SensorHeight	Maximum height of the sensor in pixels.
WidthMax	This feature represents the maximum width (in pixels) of the image after horizontal binning, decimation or any other function changing the horizontal dimensions of the image.
HeightMax	This feature represents the maximum height (in pixels) of the image after vertical binning, decimation or any other function changing the vertical dimensions of the image.
Width	This feature represents the actual image width expelled by the camera (in pixels).
Height	This feature represents the actual image height expelled by the camera (in pixels).
OffsetX	This feature represents the horizontal offset from the origin to the AOI (in pixels).
OffsetY	This feature represents the vertical offset from the origin to the AOI (in pixels).
BinningHorizontal	Number of **horizontal** photo-sensitive cells to combine together. This increases the intensity (or signal-to-noise ratio) of the pixels and reduces the **horizontal** resolution (**width**) of the image.
BinningVertical	Number of **vertical** photo-sensitive cells to combine together. This increases the intensity (or signal-to-noise ratio) of the pixels and reduces the **vertical** resolution (**height**) of the image.
DecimationHorizontal	Not applicable
DecimationVertical	Not applicable
PixelFormat	List with all available pixel formats of the camera, e.g. MONO12.
TestImageSelector	Enables or disables the internal test image generator of the camera.

Table 17: Camera standard feature: ImageSizeControl

AcquisitionControl

Feature	Description
AcquisitionMode	This feature controls the acquisition mode of the software. This feature works independently (!) of the chosen camera mode (Continuous, IOD hardware trigger, IOD hardware timer). It describes how many frames should be acquired.
AcquisitionStart	Starts the image acquisition of the camera.
AcquisitionStop	Stops the image acquisition of the camera.
TriggerMode	Modifies the trigger mode of the camera. When the trigger mode is "Off", the camera will generate frames independently. When the trigger mode is "On" the camera is switched to the so called IOD (image-on-demand) mode. In this mode the camera waits for an external trigger signal or an timer pulse generated internally. To control exposure and dark time, trigger mode must be switched to "On".
ExposureMode	Start or stop the internal exposure signal timer.
ExposureTime	This feature is used to set the Exposure time (in microseconds).
ExposureTimeAbs	This feature is used to set the Exposure time (in microseconds).
ExposureTimeGranularity	Exposure time granularity.
ExposureTimeAbsMs	This feature is used to set the Exposure time (in milliseconds).
DarkTime	This feature is used to set the Dark time (in microseconds).
DarkTimeAbs	This feature is used to set the Dark time (in microseconds).
DarkTimeGranularity	Dark time granularity.
DarkTimeAbsMs	This feature is used to set the Dark time (in milliseconds).

Table 18: Camera standard feature: AcquisitionControl

AnalogControls

Feature	Description
Gain	This feature controls the selected gain as a raw integer value.

Table 19: Camera standard feature: AnalogControls

CameraSpecialFeatures

This feature is not available for Bigeye P-1100B/C Cool and Bigeye P-132B.

Feature	Description
CameraTemperatureState	Camera temperature state.
	0 = The camera temperature is OK.
	1 = The camera temperature is outside the optimum range.
CameraTemperatureStateReg	Camera temperature state register.
QueryCameraTemperatureState	Query camera temperature state.

Table 20: Camera special feature: Camera temperature

CameraSpecialFeatures\BackgroundCorrection

This feature is available for all Bigeye models.

Feature	Description
BGC_OperationMode	Operation mode of the background correction.
	(U=<value> command)
	While reading this feature the MSB shows the state of the integration process.
	(0=Idle, 1=Busy)
BGC_OffsetValue	Offset value for the background correction.
	(M=<value> command)

Table 21: Camera special feature: BackgroundCorrection

Feature	Description
BGC_StartIntegration_1	Save the next frame as background image (l=0 command)
BGC_StartIntegration_4	Integrate the next 4 frames and store the result as background image (l=1 command).

Table 22: Camera special feature: BackgroundCorrection

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